Prevention of Adhesion Bands by Ibuprofen-Loaded PLGA Nanofibers

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In this study, prevention of the adhesion bands and inflammatory features has been investigated using poly (lactic-co-glycolic acid)-ibuprofen (PLGA-IB) nanofibrous meshes in a mice model. To find the optimized membrane for prevention of postoperative adhesion bands, we have compared PLGA-IB group with PLGA, IB, and control groups in a mice adhesion model. Two scoring adhesion systems were used to represent the outcome. According to the results obtained in this study, the PLGA-IB nanofiber membrane showed a greater reduction in adhesion band than other groups. In conclusion, among FDA-approved polymers and drugs, PLGA-IB meshes could be applicable as a potential candidate for prevention of postoperative abdominal inflammation and adhesion bands formation. © 2016 American Institute of Chemical Engineers *Biotechnol. Prog.*, 32:990–997, 2016
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Introduction

Wound healing is a complex process in which a series of cellular and humoral components interact to re-epithelialize a wound defect.[1] Peritoneal adhesions are a worldwide problem and may occur following any type of abdominal or pelvic surgery. They are fibrous bands that form between tissues and organs. These bands are the consequence of inflammatory reactions after damage to the peritoneum and have been well recognized as an important part of the wound healing process.[2] Invasive surgery is typically accompanied by a number of clinical problems, induced or exacerbated by adhesion bands, including female infertility, bowel obstruction, and difficult reoperative procedures. Adhesion bands have often been reported in clinical patients with foreign body reaction/infection, trauma, ischemia, and hemorrhage.[2–6]

The hope now is to identify agents that would efficiently reduce the formation of adhesion in various surgical procedures without inducing side effects. In moving toward this goal, different strategies such as various surgical techniques, surgical adjuvants for example fibrinolytic agents, anticoagulants, anti-inflammatory agents, antibiotics, different barriers and mechanical separation have been tested to prevent or at least diminish the high incidence of adhesions in patients.[4] Among these strategies, it seems physical barriers are one of the most accepted methods for prevention of adhesion formation.[7]

An antiadhesive barrier not only should have appropriate mechanical properties to facilitate handling and manipulation but also needs to possess suitable biomaterial surface hydrophilicity from the point of view of surface chemistry. A reduced amount of cell attachment is often seen on surfaces with a high hydrophilic nature.[8,9]

Previous finding have provided evidence that synthetic polymeric materials are preferable to natural agents in this context, mainly due to their ease of handling and lower level of immunogenicity. The principal objective of using synthetic barriers is to prevent mechanical contact between tissues around the damaged site to reduce these bands during the important period of peritoneal repair and healing. By reducing the formation of a fibrin matrix between serosal

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